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Accuracy of Clinical Coding of Pleural Empyema: A Validation Study

Short running title: Clinical coding of pleural empyema

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Abstract:

Introduction:

Routinely recorded coding data is increasingly being used for clinical research, but the quality of that data is often variable. The clinical coding of pleural empyema has not been studied. If data is not accurately recorded, linking coding data through, for example Hospital Episode Statistic data (HES) will lead to inappropriate conclusions.

Methods:

We extracted the coding data for a year from 3 hospitals in the South-West of England, UK: One a large district general hospital, one a tertiary pleural referral centre, and one a thoracic surgical centre. We verified and validated this coding to ensure its accuracy. To assess the sensitivity of coding, we then verified the coded cases against a cohort of proven empyema patients from a recent observational study.

Results:

182 patients with a coded diagnosis of pleural empyema were extracted. In 158 of these patients, the diagnosis was correct clinically, with a positive predictive value of 86%. In the cohort of 25 patients with a known clinical diagnosis of empyema, 18 were coded as empyema, a sensitivity of 72%. There was no significant difference in coding between hospitals.

Conclusion:

In the centres studied, empyema coding was generally good (>85% accuracy), although some cases were mis-coded. Using codes for elective admissions helped to differentiate post-operative from community acquired empyema. It is likely empyema is under rather than over-recorded in HES data.

Keywords; Pleural Effusion, Empyema, Clinical Coding, Epidemiology.

Brief Report

Introduction:

Increasingly, research is performed on routinely recorded clinical data, such as hospital episode statistics (HES)¹. In uncommon infectious diseases like pleural empyema, this data would be very useful in assessing trends in response to vaccination, or changes in microbiological epidemiology. Within the UK, empyema also has a significant healthcare tariff, and as such accurate recording is vital to ensure hospitals get appropriately reimbursed for care.

HES data relies on accurate clinical coding, and empyema can pose a difficulty for clinical coders: requiring both a clinical, radiological, and microbiological elements to make a diagnosis. Additionally, a significant amount of empyema occurs post-surgery. Although this often meets the definition of empyema, it does not have the same microbiological, epidemiological, and demographics as 'community acquired' empyema².

We aimed to assess the accuracy of coding for empyema across three separate trusts, one a district general hospital, one a tertiary pleural referral centre, and one a thoracic and upper gastrointestinal surgical centre.

Methods:

This was a retrospective, observational study, in two parts. In the first part, HES data was extracted for one year (August 2017 to August 2018) from the Royal United Hospital in Bath (Centre 1), the Bristol Royal Infirmary (Centre 2) and Southmead Hospital (Centre 3), both in Bristol (United Kingdom). These cases were verified to assess accuracy (see below). In the second part, data from participants in the Pleural Infection Longitudinal Outcome (PILOT) observational study of pleural empyema (for which Southmead Hospital was a recruitment centre between 2014 and 2016) was extracted. The coding of these known cases were cross checked with hospital coding data from the same period.

The coded diagnoses of pleural empyema is defined as J86-, also known as pyothorax. The clinical diagnosis of empyema was made on retrospective review of the notes, discharge summary, radiology, and microbiology available. Empyema was considered as a pleural effusion that either had a documented pH of less than 7.2, microscopic evidence of infection, or frank pus. If microscopic evidence was not available, then clear clinical management as empyema (supporting radiology, clinical progress, biochemistry) were used.

All cases were reviewed by an infectious disease physician, or a respiratory physician.

Simple demographic data was collected, and the sensitivity and accuracy of coding for a clinical diagnosis were calculated. One of our aims was to differentiate empyema associated with community acquired infection from post-surgical empyema and we aimed to see if the approach of only identifying emergency admissions rather than elective admissions would be valuable.

Results:

Overall, 182 patients with a coded diagnosis of empyema were identified: 100 from Centre 2, and 49 and 33 from Centres 1 and 3 respectively. This coding was accurate in 158 cases (86.8%). There were no significant differences coding accuracy between hospitals, despite the majority of patients in the surgical centres being transfers, rather than local patients. False positive rates were comparable across the three trusts: 16% at Centre 1, 10% at Centre 2, 18% at Centre 3 ($p = 0.36$ by χ^2).

In the cohort of patients with a confirmed clinical diagnosis of empyema from the PILOT study, the coding was less accurate: of 25 patients, only 18 had the correct code at discharge, although one had no discharge summary, and one was transferred to the surgical centre. The sensitivity of coding was calculated as 72% (95% CI 51%-88%). The most common replacement code was 'pleural effusion otherwise unspecified'.

In the surgical centre, limiting the codes to exclude elective admissions slightly increased the accuracy of coding (from 90% to 93%). This coding also excluded the vast majority (14/21) of empyema secondary to cardiothoracic or upper GI surgery.

Conclusion:

Empyema coding was specific, with over 85% of discharge HES codes recorded accurately. However, in our prospectively collected cohort of patients known clinically to have empyema, 72% were coded as such, with the remainder having codes for an unclassified pleural effusion. Excluding codes for elective admission removed 2/3 of the post-surgical empyema, enabling more accurate identification of 'community acquired empyema'.

References:

1. Hallifax RJ, Goldacre R, Landray MJ, Rahman NM, Goldacre MJ. Trends in the Incidence and Recurrence of Inpatient-Treated Spontaneous Pneumothorax, 1968-2016. *JAMA*. 2018;320(14):1471. doi:10.1001/jama.2018.14299
2. Davies HE, Davies RJO, Davies CWH, BTS Pleural Disease Guideline Group. Management of pleural infection in adults: British Thoracic Society Pleural Disease Guideline 2010. *Thorax*. 2010;65 Suppl 2(Suppl 2):ii41-53. doi:10.1136/thx.2010.137000

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Conflicts of interest: The authors declare they have no conflicts of interest.

Ethical approval: As this study was performed as a routine audit of clinical coding, ethical approval was not indicated. This was discussed with the ethics board at the Royal United Hospital NHS Foundation Trust

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